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ABSTRACT

The United States Training and Employment Service General Aptitude Test Battery (GATB), first published in 1947, has been included in a continuing program of research to validate the tests against success in many different occupations. The GATB consists of 12 tests which measure nine aptitudes: General Learning Ability; Verbal Aptitude; Numerical Aptitude; Spatial Aptitude; Form Perception; Clerical Perception; Motor Coordination; Finger Dexterity; and Manual Dexterity. The aptitude scores are standard scores with 100 as the average for the general working population, and a standard deviation of 20. Occupational norms are established in terms of minimum qualifying scores for each of the significant aptitude measures which, when combined, predict job performance. Cutting scores are set only for those aptitudes which aid in predicting the performance of the job duties of the experimental sample. The GATB norms described are appropriate only for jobs with content similar to that shown in the job description presented in this report. A description of the validation sample and a personnel evaluation form are also included. (AG)

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Development of USES Aptitude Test Battery for Offset-Duplicating-Machine Operator

(clerical) 207.782

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U.S. DEPARTMENT OF LABOR
W. Willard Wirtz, Secretary
MANPOWER ADMINISTRATION
BUREAU OF EMPLOYMENT SECURITY
Washington, D.C. 20210

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Technical Report on Development of USES Aptitude Test Battery

For .....

Offset-Duplicating-Machine Operator (clerical) 207.782

S-358

U. S. Employment Service
in Cooperation with
California, Connecticut, Louisiana, Michigan, Nebraska,
New Jersey, Ohio, Oregon, Pennsylvania,
Texas, and Wisconsin State Employment Services

August 1966

GATB Study #2584

DEVELOPMENT OF USES APTITUDE TEST BATTERY

For

Offset-Duplicating-Machine Operator (clerical) 207.782

S-358

This report describes research undertaken for the purpose of developing General Aptitude Test Battery (GATB) norms for the occupation of Offset-Duplicating-Machine Operator (clerical) 207.782. This study was conducted at the request of and in cooperation with Mr. Samuel M. Burt, former Managing Director of the Education Council of the Graphic Arts Industry, Inc. and officials of Reproductions Review, a trade journal published by Wolf Business Publications, Inc. The following norms were established:

GATB Aptitudes	Minimum Acceptable GATB, B-1002 Scores
P - Form Perception	75
F - Finger Dexterity	80
M - Manual Dexterity	90

RESEARCH SUMMARY

Sample:
86 (25 female and 61 male) Offset-Duplicating-Machine Operators employed in various states.

Criterion:
Supervisory ratings.

Design:
Concurrent (test and criterion data were collected at approximately the same time.)

Minimum aptitude requirements were determined on the basis of a job analysis and statistical analyses of aptitude mean scores, standard deviations, aptitude-criterion correlations and selective efficiencies.

Concurrent Validity: Phi Coefficient = .34 ($P/2 < .005$)

Effectiveness of Norms: Only 67% of the non-test-selected workers used for this study were good workers; if the workers had been test-selected with the above norms, 79% would have been good workers. 33% of the non-test-selected workers used for this study were poor workers; if the workers had been test-selected with the above norms, only 21% would have been poor workers. The effectiveness of the norms is shown graphically in Table 1:

TABLE 1

Effectiveness of Norms

	Without Tests	With Tests
Good Workers	67%	79%
Poor Workers	33%	21%

SAMPLE DESCRIPTION

Size: N = 86

Occupational Status: Employed workers. (Only Offset-Duplicating-Machine Operators who spend the majority of their time operating offset-duplicating machines were included in the experimental sample.)

Work Setting: Workers were employed by the following companies:

1. Nela Press #448, Nela Park, Cleveland, Ohio
2. The General Tire & Rubber Co., 1708 Englewood Ave., Akron, Ohio
3. Kent State University, Kent, Ohio
4. The Electric Storage Battery Co., Automotive Division, 2000 The East Ohio Building, Cleveland, Ohio
5. Southern Union Gas, Dallas, Texas
6. Oil Well Supply, Dallas, Texas
7. Fidelity Union Life, Dallas, Texas
8. Sun Oil Company, Dallas,Texas
9. State of Nebraska, Dept. of Roads, Lincoln, Nebraska
10. University of Nebraska, Dept. of Information, Lincoln, Nebraska
11. State of Nebraska, Dept. of Purchasing, Lincoln, Nebraska
12. Bankers Life Insurance Co., Lincoln, Nebraska
13. Sharon Steel Corp., Farrell, Penna.
14. New Holland Machine Co., New Holland, Penna.
15. Armstrong Cork Company, Lancaster, Penna.
16. Penna. Liquor Control Board, Harrisburg, Penna.
17. The Kelley Company, 642 Broadway, McKeesrocks, Penna.
18. ITT Communications Systems, Paramus, New Jersey
19. Wayne State University, Detroit, Michigan
20. Mirro Aluminum Company, Manitowoc, Wisconsin
21. Twin Disc Clutch, Racine, Wisconsin
22. Oregon Education Association, 1590 S.W. Taylor St., Portland, Oregon
23. McNeese State College, Lake Charles, Louisiana
24. L. C. Bedds Corp., 187 Bank Street, Waterbury, Conn.
25. Anaconda American Brass Co., 395 Benedict Street, Waterbury, Conn.
26. Typewriter Division, Sperry Rand Corp., 60 Main Street, Bridgeport, Conn.
27. G. F. Heublein Inc., 330 New Park Avenue, Hartford, Conn.
28. System Development Corp., Santa Monica, California
29. San Juan Unified School District, Carmichael, California

Employer Selection Requirements:

Education: No consistent requirement.
Previous experience: Varied with employer, although most required no previous experience.
Tests: Varied with employer, some giving no tests, others administering tests which were not used in selection. Still other employers administered the Wonderlic Personnel Test with a cut-off of 20 or the McQuaig Test with a cut-off of 15-20. In most cases of employment with a state, a civil service test was required.
Other: Most employers relied on school records, the interview, and job trial. Some companies required a company physical and one gave a color vision test.

Principal Activities: The job duties for each worker are comparable to those shown in the job description in the Appendix.

Minimum Experience: All workers in the sample had at least six months total job experience.

TABLE 2

Means, Standard Deviations (SD), Ranges and Pearson Product-Moment Correlations with the Criterion (r) for Age, Education, and Experience

	Mean	SD	Range	r
Age (years)	30.9	9.5	18-60	-.021
Education (years)	11.8	1.4	7-15	.168
Experience (months)	65.6	68.1	6-337	.075

EXPERIMENTAL TEST BATTERY

All 12 tests of the GATB, B-1002B were administered within the first three months of 1965. In addition, the Stanford Intermediate II Paragraph Meaning Test and the USES Non-reading Measure of Aptitude G were administered to each member of the sample as part of a special study.

CRITERION

The criterion data consisted of supervisory ratings of job proficiency made at approximately the same time as test data were collected. The ratings were made by the immediate supervisor of each worker.

Rating Scale: The scale (see Appendix) consists of seven items adapted from Form SP-21 covering different aspects of job performance. Each item has five alternatives corresponding to different degrees of job proficiency.

Reliability: The correlation between the first and second sets of supervisory ratings (obtained at a two-week interval) is .93. On this basis, the two ratings were combined as the final criterion.

Criterion Score Distribution:	Possible range:	14-70
	Actual range:	30-70
	Mean:	51.6
	Standard Deviation:	9.4

Criterion Dichotomy: The criterion distribution was dichotomized into low and high groups by placing 33% of the sample in the low group to correspond with the percentage of workers considered unsatisfactory or marginal. Workers in the high criterion group were designated as "good workers" and those in the low group as "poor workers." The criterion critical score was 46.

APTITUDES CONSIDERED FOR INCLUSION IN THE NORMS

Aptitudes were selected for tryout in the norms on the basis of a qualitative analysis of job duties involved and a statistical analysis of test and criterion data. Aptitude P was considered for inclusion in the norms even though it did not have a significant correlation with the criterion because it was judged to be important for job success and the experimental sample had a relatively high mean on Aptitude P. With employed workers, a relatively high mean score may indicate that some sample pre-selection has taken place. Tables 3, 4, and 5 show the results of the qualitative and statistical analyses.

TABLE 3

Qualitative Analysis
(Based on the job analysis, the aptitudes indicated appear to be important to the work performed.)

Aptitude	Rationale
P - Form Perception	Required in the adjustment of machinery and inspection of the printed copy.
K - Motor Coordination	Necessary for machine loading and unloading and machine adjusting.
F - Finger Dexterity	Necessary for positioning copy and minute adjustments to machine.
M - Manual Dexterity	Important for maintenance and cleaning of machine and plates.

TABLE 4

Means, Standard Deviations (SD), Ranges, and Pearson Product-Moment Correlations with the Criterion (r) for the Aptitudes of the GATB

Aptitude	Mean	SD	Range	r
G - Gernal Learning Ability	103.8	14.5	60-134	.181
V - Verbal Ability	100.1	13.2	61-139	.152
N - Numerical Aptitude	100.3	14.8	51-136	.221*
S - Spatial Aptitude	108.4	19.3	61-147	.113
P - Form Perception	103.4	19.9	50-147	.143
Q - Clerical Perception	103.8	14.1	70-143	.267*
K - Motor Coordination	103.4	19.1	33-146	.137
F - Finger Dexterity	97.7	19.8	37-135	.238*
M - Manual Dexterity	103.5	20.5	37-148	.283**

*Significant at the .05 level
**Significant at the .01 level

TABLE 5

Summary of Qualitative and Quantitative Data

Type of Evidence	Aptitudes								
	G	V	N	S	P	Q	K	F	M
Job Analysis Data									
Important					X		X	X	X
Irrelevant		X							
Relatively High Mean	X			X	X	X			X
Relatively Low SD	X	X	X			X			
Significant Correlation with Criterion	X		X			X		X	X
Aptitudes to be Considered for Trial Norms	G		N		P	Q		F	M

DERIVATION AND VALIDITY OF NORMS

Final norms were derived on the basis of a comparison of the degree to which trial norms consisting of various combinations of Aptitudes G, N, P, Q, F, and M, at trial cutting scores were able to differentiate between 67% of the sample considered good workers and 33% of the sample considered poor workers. Trial cutting scores at five point intervals approximately one standard deviation below the mean are tried because this will eliminate about 1/3 of the sample with three-aptitude norms. For two-aptitude trial norms, minimum cutting scores of slightly lower than one standard deviation below the mean will eliminate about 1/3 of the sample; for four-aptitude trial norms, cutting scores of slightly higher than one standard deviation below the mean will eliminate about 1/3 of the sample. The Phi Coefficient was used as a basis for comparing trial norms. Norms of P-75, F-80, and M-90 provided the highest degree of differentiation for the occupation of Offset-Duplicating-Machine Operator 1-25.26. The validity of these norms is shown in Table 6 and is indicated by a Phi Coefficient of .34 (statistically significant at the .005 level).

TABLE 6

Concurrent Validity of Test Norms, P-75, F-80, and M-90

	Nonqualifying Test Scores	Qualifying Test Scores	Total
Good Worker	13	45	58
Poor Workers	16	12	28
Total	29	57	86

Phi Coefficient (ϕ) = .34 Chi Square (X^2) = 10.17
Significance Level = $P/2 < .005$

DETERMINATION OF OCCUPATIONAL APTITUDE PATTERN

The data for this study met the requirements for incorporating the occupation studied into OAP-32 which is shown in Section II of the Manual for the General Aptitude Test Battery. A Phi Coefficient of .32 is obtained with the OAP-32 norms of P-75, F-80 and M-80.

SP-21
Rev. 2/61

A-P-P-E-N-D-I-X

DESCRIPTIVE RATING SCALE
(For Aptitude Test Development Studies)

Score____

RATING SCALE FOR _____
D. O. T. Title and Code

Directions: Please read Form SP-20, "Suggestions to Raters", and then fill in the items listed below. In making your ratings, only one box should be checked for each question.

Name of Worker (print) _____
(Last) (First)

Sex: Male_____ Female_____

Company Job Title: _____

How often do you see this worker in a work situation?

☐ See him at work all the time.

☐ See him at work several times a day.

☐ See him at work several times a week.

☐ Seldom see him in work situation.

How long have you worked with him?

☐ Under one month.

☐ One to two months.

☐ Three to five months.

☐ Six months or more.

A. How much work can he get done? (Worker's ability to make efficient use of his time and to work at high speed.)

☐ 1. Capable of very low work output. Can perform only at an unsatisfactory pace.

☐ 2. Capable of low work output. Can perform at a slow pace.

☐ 3. Capable of fair work output. Can perform at an acceptable but not a fast pace.

☐ 4. Capable of high work output. Can perform at a fast pace.

☐ 5. Capable of very high work output. Can perform at an unusually fast pace.

B. How good is the quality of his work? (Worker's ability to do high-grade work which meets quality standards.)

☐ 1. Performance is inferior and almost never meets minimum quality standards.

☐ 2. The grade of his work could stand improvement. Performance is usually acceptable but somewhat inferior in quality.

☐ 3. Performance is acceptable but usually not superior in quality.

☐ 4. Performance is usually superior in quality.

☐ 5. Performance is almost always of the highest quality.

C. How accurate is he in his work? (Worker's ability to avoid making mistakes.)

☐ 1. Makes very many mistakes. Work needs constant checking.

☐ 2. Makes frequent mistakes. Work needs more checking than is desirable.

☐ 3. Makes mistakes occasionally. Work needs only normal checking.

☐ 4. Makes few mistakes. Work seldom needs checking.

☐ 5. Rarely makes a mistake. Work almost never needs checking.

D. How much does he know about his job? (Worker's understanding of the principles, equipment, materials and methods that have to do directly or indirectly with his work.)

☐ 1. Has very limited knowledge. Does not know enough to do his job adequately.

☐ 2. Has little knowledge. Knows enough to "get by."

☐ 3. Has moderate amount of knowledge. Knows enough to do fair work.

☐ 4. Has broad knowledge. Knows enough to do good work.

☐ 5. Has complete knowledge. Knows his job thoroughly.

E. How much aptitude or facility does he have for this kind of work? (Worker's adeptness or knack for performing his job easily and well.)

☐ 1. Has great difficulty doing his job. Not at all suited to this kind of work.

☐ 2. Usually has some difficulty doing his job. Not too well suited to this kind of work.

☐ 3. Does his job without too much difficulty. Fairly well suited to this kind of work.

☐ 4. Usually does his job without difficulty. Well suited to this kind of work.

☐ 5. Does his job with great ease. Exceptionally well suited for this kind of work.

G. How resourceful is he when something different comes up or something out of the ordinary occurs? (Worker's ability to apply what he already knows to a new situation.)

☐ 1. Almost never is able to figure out what to do. Needs help on even minor problems.

☐ 2. Often has difficulty handling new situations. Needs help on all but simple problems.

☐ 3. Sometimes knows what to do, sometimes doesn't. Can deal with problems that are not too complex.

☐ 4. Usually able to handle new situations. Needs help on only complex problems.

☐ 5. Practically always figures out what to do himself. Rarely needs help, even on complex problems.

H. Considering all the factors already rated, and only these factors, how acceptable is his work? (Worker's "all-around" ability to do his job.)

☐ 1. Would be better off without him. Performance usually not acceptable.

☐ 2. Of limited value to the organization. Performance somewhat inferior.

☐ 3. A fairly proficient worker. Performance generally acceptable.

☐ 4. A valuable worker. Performance usually superior.

☐ 5. An unusually competent worker. Performance almost always top notch.

S-358 August 1966

FACT SHEET

Job Title: Offset-Duplicating-Machine Operator (clerical) 207.782 (1-25.26)

Job Summary: Sets up and operates an offset duplicating machine which imprints illustration and type onto paper stock from prepared paper or metal plates.

Work Performed: Obtains reproduction work order from order rack or supervisor. Gathers specified type and quality of paper stock to complete work order. Loads reams of paper onto magazine platform of elevator table. Turns hand crank to lower or raise platform to desired height, to accommodate loading process. Raises elevator table to specified distance below paper separator to insure proper feed. Loosens thumb screws controlling slide bar and back stop, slides bar and stops in position against paper and tightens screws holding slide bar and back stop stationary. Positions and tightens paper guides of feeding channel to hold edges of paper parallel with magazine channel. Adjusts double sheet detector to prevent double sheets from being fed through machine. Cleans ink from blanket of machine using rag and solvent preparatory to printing. Clamps or hooks one end of plate to plate cylinder, operates press manually to wrap plate in place around cylinder, and clamps other end of plate to cylinder. Fills ink fountain (trough) with ink of proper color and consistency and spreads onto rollers using putty knife. Fills reservoir with repellant solution and adjusts dampening rollers so that sufficient moisture will be applied to plate to keep non-image portions ink resistant. Turns on and allows press to run until all ink rollers are thoroughly coated with ink and all dampening rollers are thoroughly saturated with water. Adjusts knobs controlling spacing between blanket and impression cylinder to thickness of stock to be printed and sets water roller so as to deliver proper moisture to plate cylinder. Starts machine and runs sample copies through press. Inspects sample copies for defects in margin, image, and plate surface and makes any necessary adjustments to machine. Examines printed copy to determine whether or not proper balance is maintained between dampening solution and ink being transferred to plate. Starts motor to commence run and observes operation, making adjustments as needed to maintain quality of copy.

Adjusts paper receiver of machine to insure that paper is stacked properly. Unloads paper receiver and stacks paper on tables or drying racks. Performs such minor maintenance duties as changing belts and rollers. Lubricates and cleans press when needed. Removes plate from press at end of run, and cleans plate and cylinder with solvents or water.

NOTE: Since the process involved is essentially the same for offset presses and offset duplicating machines, the following distinctions are important:

1. Size - Offset press is larger, size of copy 17-1/2" by 22-1/2" or larger.
2. Quality of work - Offset presses are used when a high quality copy is desired.
3. Complexity - Offset press is more complex.

The trade names of some frequently encountered offset duplicating machines are Davidson 241, Davidson Dualith 500, Multilith 2066, Multilith 1250, ATF 15 Chief.

(This sheet is printed in duplicate. One copy should remain as part of the Appendix in order to complete the technical report. The other copy can be removed by employment service personnel who wish to set up separate fact sheet files.)

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